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Longevity is increasing – what about the retirement age?

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SUMMARY

Life expectancy has continued to increase for a very long time. When considering long-term pension expenditure a key factor is whether this trend is continuing, slowing down or stopping. The aim of the paper is to sort out technical alternatives of adjusting the retirement age to the changes in life expectancy. The alternatives can be divided into two main groups:

- adjusting the accrued pension when granted according to changes in mortality rates. The aim of the coefficient is to reflect part of the increase in life expectancy in the number of working years
- gradually raising the set retirement age.

The main focus is on old-age pensions but the effect of raising the retirement age on disability pensions is also discussed. A brief review of the situation in selected countries is also included.

The theoretical background to the method of adjusting pensions to changes in longevity is presented and recalculation of the adjustment factor using either observed or projected mortality rates is discussed. In addition, the longevity adjustment method is applied to Finnish data.

A major reform of the Finnish statutory earnings-related pension scheme will take effect in 2005. The reform is presented in brief but the main focus is on the chosen method of adjusting pensions to changes in longevity.

1 INTRODUCTION

In most countries the continuously falling mortality trend and thus the corresponding increasing life expectancy has continued for a very long time. When looking at the pension expenditure in the long run, it is essential whether this trend will continue as in the past or whether it is slowing down or stopping. When making long-term projections concerning the cost of a pension scheme, the uncertainty concerning the economic assumptions is well-known but the demographic and especially the mortality fluctuation has often been considered to be under control. However, worldwide experience shows that usually calculations concerning the population projections have failed. Life expectancy has in most countries been growing faster than projected even if life expectancy in some developing countries has decreased rapidly due to AIDS. Table 1 shows that during the past five decades the life expectancy at birth in the world grew by 19 years, in Europe by 8 years and in Finland by 12 years. The table also includes the life expectancy for the countries with the lowest and highest life expectancy in the world in 2000–2005.

Table 1. Life expectancy at birth 1950–2050 (both sexes combined).

Period	Zambia	World	Europe	Finland	Japan
1950–1955	37.8	46.5	65.6	66.3	63.9
1960–1965	42.8	52.4	69.6	68.9	69.0
1970–1975	49.7	58.0	71.0	70.7	73.3
1980–1985	52.0	61.3	71.9	73.9	76.9
1990–1995	44.2	63.8	72.6	75.8	79.5
2000–2005 ^{*)}	32.4	65.4	74.2	78	81.6
2010–2015 ^{*)}	35.3	67.2	75.7	79.7	83.5
2030–2035 ^{*)}	44.5	71.3	78.8	81.8	86.6
2045–2050 ^{*)}	52.3	74.3	80.5	83	88.1

^{*)} projections

Source: United Nations <http://esa.un.org/unpp/p2k0data.asp> (medium variant)

Table 2 shows that in selected countries the life expectancy at age 65 has increased during the last 40 years by 4 years and on average by one year per decade.

As the costs of the pension schemes in most countries are increasing also due to many other reasons than longevity (e.g. the baby-boomers born after the Second World War are reaching the retirement age and the pension schemes reach maturity), the question of adjusting the retirement age to the

changes in life expectancy will arise sooner or later. There are of course a lot of reasons why people retire early, such as labour market reasons, poor health, burnout, stress and other problems influencing the atmosphere at the workplaces. Therefore a successful postponing of the effective retirement age also requires co-operation between social, health and labour authorities and between employees and employers.

Table 2. Life expectancy at age 65 in selected countries.

	Male			Female		
	1960	1980	1997	1960	1980	1997
Canada	13.6	14.6	16.3	16.1	18.6	20.1
Finland	11.5	12.6	15.0	13.7	16.8	18.9
Germany	12.4	13.0	15.2	14.6	16.7	18.9
Italy	13.4	13.3	15.8	15.3	17.1	20.2
Japan	11.6	14.6	17.0	14.1	17.7	21.8
Netherlands	13.9	13.7	14.7	15.3	18	18.8
Sweden		14.3	16.2		17.9	19.9
United Kingdom	11.9	12.9	15.0	15.0	16.9	18.5
United States	12.8	14.1	15.9	15.8	18.3	19.2
Average	12.4	13.6	15.7	14.8	17.4	19.6

Source: United Nations.

The aim of this paper is to sort out technical alternatives of adjusting the retirement age to the changes in life expectancy. The main focus is on old-age pensions and a brief review of the situation in selected countries is included.

2 PENSION SCHEMES AND LIFE EXPECTANCY

When designing or analysing a pension scheme, more important than the life expectancy at birth is the life expectancy at the entrance to the labour market, say 25 years, and the life expectancy at the entrance to retirement, say 65 years. The difference between the life expectancy at birth and the life expectancy for a certain age is visualized using observations concerning life expectancy in Finland.

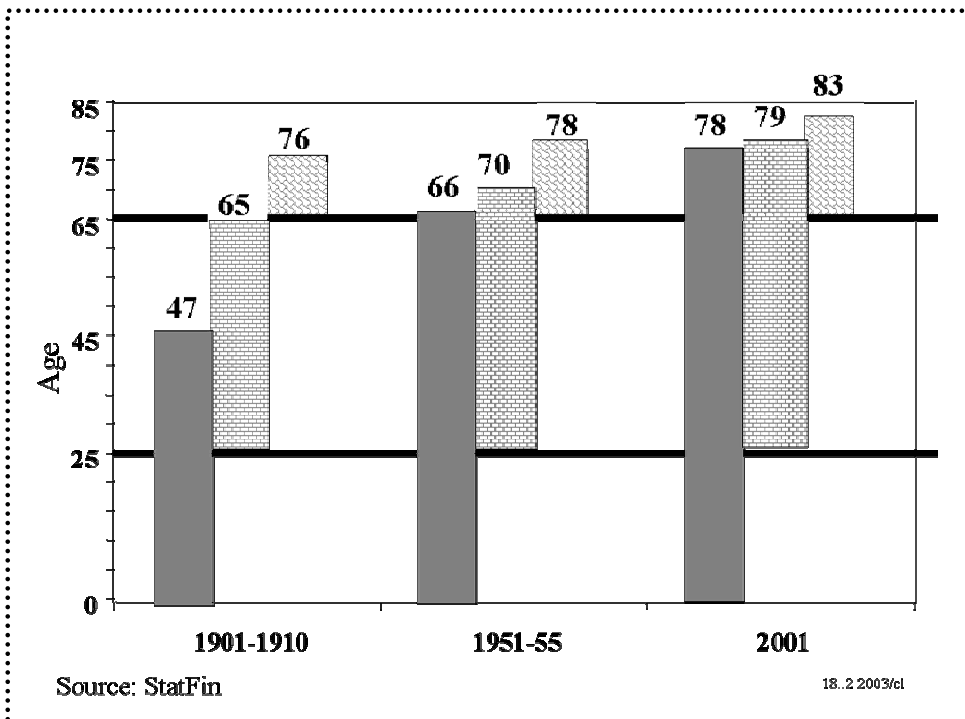


Chart 1. Changes in life expectancy in Finland at birth, at ages 25 and 65.

As shown in chart 1, the mortality rates for young people in Finland decreased very rapidly during the first half of the last century. As the total life expectancy at birth increased by 19 years, three thirds of this increase was due to decreased mortality rates for young people aged less than 25, and only one tenth of the increase was due to decreased mortality rates among elderly people aged 65+. For the last half of the century, the situation changed significantly. As the life expectancy at birth increased by 12 years, only one third was due to decreased mortality rates among young people under 25 and almost half of the change was due to decreased mortality rates among elderly people aged 65+.

Most statutory pension schemes in Europe have a fixed retirement age and usually the retirement age was set decades ago. In Finland the retirement age for civil servants was set in the 1920s, the retirement age for the national pension scheme in the 1930s and for private-sector employees in the 1960s. The life expectancy in Finland was 11 years until the 1940s for people aged 65, as is shown in chart 2. The life expectancy began to grow in the 1940s, but not very rapidly. Thus, when designing the pension schemes in Finland in the 1930s and 1950s there was not much use for past observations when projecting future life expectancy and thus the future pension costs.

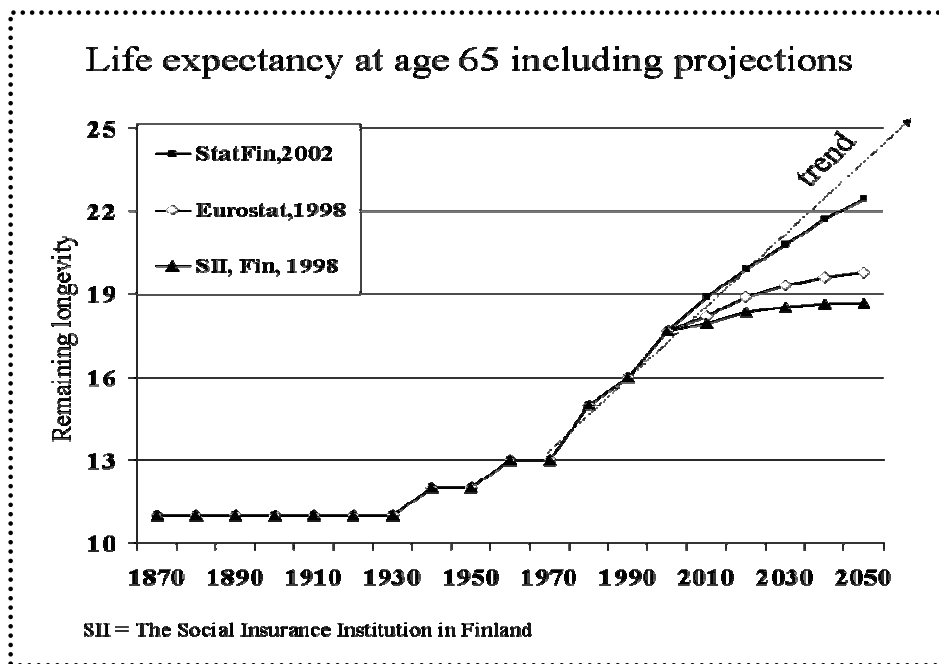


Chart 2. Changes in life expectancy in Finland at age 65 including projections.

Another way of reflecting the current retirement age is to compare it to changes in the median age of death. Using Finnish observations, one can see that in the 1930s, when the national pension scheme was designed, the age 65 was the median age of death, i.e. the age at which half of the cohort has died. If the retirement age would be similarly linked to the median age of death, the retirement age in Finland would today be 81 years.

The current situation concerning the retirement age is contradictory. The average effective retirement age has not increased substantially during the last decades, although people's health is improving, the elderly are better educated than the generation before them and life expectancy has increased. As a consequence the cost arising from the retirees has increased much more than envisaged.

With fixed retirement ages and an average time of 20 years in retirement (including early retirement) a rough estimate shows that the pension expenditure grows by 5 per cent for each year the longevity of pensioners aged 60+ is growing. Thus, using the present falling mortality trend, the life expectancy for old-age pensioners may continue to increase by one year per decade and thus the pension expenditure by 25 per cent during the next 50 years.

3 CHANGES IN RETIREMENT AGES AND ADJUSTING PENSION SCHEMES TO INCREASED LONGEVITY IN SELECTED COUNTRIES

3.1 Changes in retirement ages

In most countries the retirement ages in the statutory pension schemes are set. Previously changes in retirement ages were not so common. The trend was more to offer pathways for early retirement besides the standard retirement age. Since the 1990s the trend has changed. Countries are looking for solutions to decrease the effect of increased longevity on pension costs. Table 3 gives an overview of selected countries where the retirement age is higher than 65 years and countries where the retirement age is changing. Changes in early or deferred retirement ages are not included.

Table 3. The retirement age in selected countries.

Country	Current retirement age	Changes in retirement ages
Austria	65(M) 60(F)	60 → 65 (2024–2033) (F)
Denmark	67	65 (1.7.2004)(national pension)
Estonia	63(M) 59(F)	59→63(2016)(F)
Finland	65	63–68 (2005)(earnings-related pensions)
Great Britain	65(M), 60(F)	60→65 (2010–2020) (F)
Hungary	62(M), 59(F)	55(1996) →62 (2009) (F)
Iceland	67	–
Italy	65(M), 60(F) ¹⁾ (gradually phased out in 19 years)	57–65 (gradually implemented in 19 years)
Japan	60	60→65 (2013–2025) ²⁾
Norway	67	–
Poland	65(M), 60(F)	– ³⁾
Switzerland	65(M), 63(F)	63→65 (2009) (F)
United States	65y 4m	65→67 (2003) (2027)

1) In the current system one can retire after 35 years of coverage at age 57, regardless of age after 38 years of coverage. The years of coverage rise to 39 years in 2006 and to 40 years in 2008.

2) The retirement age for basic pensions in Japan is already raised to 65 by 2013

3) According to a government bill in Poland the retirement age for women will in 2009 start to rise gradually to 65. The raise is suggested to be 6–9 months per year.

Only in four countries, Denmark, Iceland, Norway and the USA, the retirement age is over 65. Only one country, the USA, has decided to raise the retirement age beyond 65. In 2003 it was also proposed in Germany that the standard retirement age would be raised gradually from 65 to 67, but this proposal was rejected by the Government. The most common changes are to equalise the retirement age for men and women and to raise the retirement age up to 65. Exceptions are Denmark and Finland¹. In both countries the retirement age is lowered together with tightened conditions for early retirement. The aim of lowering the retirement age is, however, to raise the average effective retirement age.

3.2 Adjusting the pension scheme to increasing longevity

Also other solutions than changing the retirement age are looked for in order to keep the pension costs in check. One method recently spread is to adjust pensions to increased longevity instead of raising the set retirement age. Often the adjustment is combined with flexible retirement ages and forces the insured to make a choice: retire at the same age as earlier cohorts with a slightly reduced pension or receive an unreduced pension by continuing to work a little bit longer. The theoretical background to adjusting pensions due to increased longevity is described in chapter 4.

The pension schemes using the adjustment method are all defined contribution (DC) or notional defined contribution (NDC) schemes. But, as shown in chapter 4, the adjustment method may as well be applied to a defined benefit (DB) scheme. In Finland, the laws including an adjustment method were ratified in June 2003. The method is presented in chapter 6. In Norway a similar adjustment method was proposed by the pension committee in January 2004.

The adjustment method can be either automatic, the adjustment coefficient can be set once or a decision may be made to recalculate the coefficient at certain intervals. An example of the first method is Sweden and of the latter is Italy.

Sweden

Sweden reformed its statutory pension scheme in 1999 and it will be gradually implemented. Sweden changed its scheme from a defined benefit scheme to a mainly notional defined contribution (NDC) scheme. In this new scheme, the main part is financed using PAYG and the pension rights accrue according to paid contributions. The contributions are adjusted with an income index and ac-

¹The retirement age is made flexible. The Finnish reform is described in chapter 6.

cumulate during the working life to a notional pension capital. The pension can be withdrawn beginning from age 61. The notional pension capital is changed to monthly life annuity payments by dividing it by the longevity factor (see chapter 4). This factor is determined separately for each cohort upon retirement using the latest available observations on mortality rates. Similar methods are also used in Poland and Lithuania.

Italy

In Italy pension rights are accruing according to a notional contribution into a notional pension capital. At retirement age the notional capital is changed to life annuity payments by multiplying the pension capital with a factor which equals the inverse value of a longevity factor. The factor is fixed for each retirement age (57–65). Unlike the Swedish scheme, the factor may be changed only every ten years by a decision of the Ministry of Labour and Social Policy in order to take into account changes in longevity and GDP.

Switzerland

In Switzerland a reform is underway, where the mandatory additional DC pension is changed. Currently the accrued pension capital is multiplied by 7.2%, which equals the inverse value of a longevity factor. The plan is to lower the percentage due to increased longevity.

Germany

Beginning in 2005, statutory earnings-related pensions in Germany will be adjusted according to a new sustainability factor. This factor will take into account the relationship between the number of pensioners and the number of contributors to the system. The factor will have the effect of reducing the annual pension adjustment if the ratio of pensioners to contribution payers changes to the detriment of the contribution payers. The new sustainability factor will thus in addition to life expectancy take into account the birth rate, immigration and emigration and the labour force participation rate. Compared to the longevity factor, this sustainability factor is not cohort-specified.

Norway

In Norway the pension committee proposed a flexible (62–70) retirement age in January 2004 and an automatic adjustment of the Norwegian defined benefit pension scheme to increased longevity. The longevity coefficient is suggested to be calculated as the inverse value of the quotient of two longevity factors (see formula (3) in chapter 4) and thus adjusting pensions to longevity is achieved by dividing the pensions with this coefficient. The proposal also includes an automatic adjustment to longevity of early retirement reductions and deferred retirement increases.

4 ADJUSTING THE PENSION SCHEME TO INCREASED LONGEVITY BY A FACTOR

4.1 The theoretical background

A factor suitable for adjusting both defined benefit and defined contribution schemes to increased longevity can be found using actuarial mathematics.

Define first the present value of a pension at retirement age as the value of a lump sum sufficient to finance the future pension expenditure, taking into account the life expectancy and a supposed yield from investing the lump sum. The present value thus depends on two main components, the mortality rates and the discount rate. The discount rate is in the long term reflecting the difference between the average yield of the lump sum and the average index used for adjusting the accrued pension rights.

The longevity indicator will be developed separately for (notional) defined contribution ((N)DC) schemes or for defined benefit (DB) schemes. Roughly the two schemes may be described as follows. In (N)DC pension schemes an accumulated (notional) pension capital is changed into a series of payments or life annuities by dividing the capital with the present value of a unit pension. In DB schemes the payments (accrued pensions) or life annuities are known, while the probable present value is calculated by multiplying the accrued pensions by the present value of a unit pension. The theoretical background of the present value is shortly defined as follows. A more comprehensive definition of both present values and life annuity values can be found in e.g. Iyer[1999].

Define p_x as the probability of surviving to age $w+x$ given survival to w . Life expectancy at age w equals

$$\sum_{x=0} p_x \cdot$$

Let i be a discount rate such that the value of one euro received at age $w+x$ is worth $(1+i)^{-x}$ at age w . Suppose that the pension is paid once a year, at the beginning of the year, at the rate of one euro per year. Then, the expected value of the whole pension is²

² A series of payments at the beginning of each year is called life annuity-due. As pensions are usually paid once a month, a more accurate formula is achieved with calculations on a monthly basis instead of a yearly basis. A good approximation of the monthly formula is, however, achieved if the payments are supposed to be in the middle of each year. The monthly formula is presented in the context of longevity adjustments for DC schemes later in this chapter and the simplified formula in chapter 6 concerning the Finnish pension scheme. In order to keep the formulas in this chapter universal the classical life annuity-due is used.

$$(1) {}_i\ddot{a}_w = \sum_{x=0}^{\infty} p_x (1+i)^{-x}$$

The probability of surviving to age $w+x$ given survival until w is the probability to survive to age $w+1$ given survival to w plus the probability to survive to age $w+2$ given survival to age w plus, ..., plus survival to age $w+x$ given survival to age w . Using the notes in life tables (mortality tables) the probability of surviving to age $w+1$ given survival to age w may be written as l_{w+1}/l_w , where l_w is the number of survivals at age w from a given hypothetical initial number of newborns, say, 100 000. If the mortality rate q_x at age x , $x = 0,1,2, \dots$ is known, the number of survivals at age $x+1$ may be calculated as

$$l_{x+1} = l_x (1 - q_x) \quad \text{and} \quad l_0 = 100\,000.$$

Thus the present value of a unit pension may be written as

$$(2) {}_i\ddot{a}_w = \sum_{x=0}^{\infty} (l_{w+x}/l_w) (1+i)^{-x} = N_w/D_w$$

$$\text{where } N_w = \sum_{x=0}^{\infty} l_{w+x} (1+i)^{-(x-w)} \quad \text{and} \quad D_w = l_w (1+i)^{-w}$$

(in actuarial mathematics N and D are noted as commutation functions).

The adjustment indicator, called a longevity factor, is now the present value of a unit pension (e.g. a pension of one euro per year), which is regularly recalculated using new information on mortality rates. Mortality rates and life expectancy are often calculated separately for males and females. However, only one shared factor for both genders is developed, because in a statutory pension scheme the benefits are not allowed to be determined on the basis of gender. When shared values do not exist, the shared value is calculated from gender-specific values using weighted averages. If the discount rate used is zero, the longevity factor is equal to life expectancy. Thus the value of the longevity factor changes with the age of calculation: the higher the calculation age, the smaller the factor.

Adjusting the pensions to increased longevity in DC and NDC schemes is simply achieved when changing the accumulated (notional) capital into life annuities by dividing the capital with the longevity factor presented in formula 2 (or equivalently by multiplying with the inverse value of this factor) calculated at the effective age of retirement. In (N)DC pension schemes the longevity factor automatically takes into account early pension reductions and deferred pension increases.

Example

In Sweden the formula for the longevity factor is an application of formula (2) with a discount rate of 1.6% and with the exception that the longevity factor is calculated on a monthly basis instead of a yearly basis. The formula used in Sweden is thus

$$(2a) \quad \ddot{a}_x = N_x - D_x \cdot \frac{1}{12} \sum_{i=0}^{12} (l_{x+i-12} - l_x) \cdot 1.016^{-i/12},$$

where x is the actual retirement age (from the age of 61 onwards). The present value of a unit pension is set yearly for each cohort and retirement age.

In order to develop a longevity indicator suitable for DB schemes add a dimension t to the probable present value in formula (2). Year t expresses the year when the mortality rates are calculated. If the present value of a unit pension is not allowed to increase after a certain year t_0 then the longevity coefficient at retirement age w and year t may be calculated as the quotient of the present value ${}_i\ddot{a}_w(t_0)$ at year t_0 and the present value ${}_i\ddot{a}_w(t)$ at year t as

$$(3) \quad k_w(t) = \frac{{}_i\ddot{a}_w(t_0)}{{}_i\ddot{a}_w(t)}.$$

In DB schemes adjusting pensions to increased longevity is now achieved by multiplying the accrued pension by a coefficient, which is the quotient of two longevity factors as presented in formula (3) (or equivalently by dividing by the inverse value of this quotient)³. Both longevity factors are calculated at the set retirement age but at different years: one at the base year t_0 , which is the year when the longevity factor was introduced, and the other at year t, which is the year when the insured reaches the set retirement age.

In a DB scheme where the retirement age is set and the pension may be taken early or postponed, the present value needs to be calculated at an age less than or at an age higher than the retirement age. In these calculations, the conditional probability in formula (1) is interpreted as the present value of the pension at a given age $w+x$ or $w-x$ given the retirement age w. Thus the longevity coefficient may be further developed to automatically take into account early pension reductions and deferred pension increases. The present value of an early or deferred pension at age $w+x$ is

³ The purpose is to stress that the terms dividing and multiplying are used in both DC and DB pension schemes. The difference between the adjusting methods are that in a DB scheme the starting value is 1 (the quotient of two identical longevity factors) and this value either increases or decreases in time depending on whether the adjusting is carried out by dividing or multiplying the pension with the longevity coefficient. In a (N)DC scheme there is no starting value. Dividing the accumulated capital with the longevity factor, say 15, is equivalent to multiplying the capital with the inverse value 0.067 or 6.7%.

$$(4) {}_iN_{w+x}(t) = {}_iD_w(t), \text{ where } x = 1, 2, \dots \text{ or } x = 1, 2, \dots.$$

The longevity coefficient can now be written as the quotient of the present value at the set retirement age of a unit pension at year t_0 and the present value of the early or deferred pension at age $w+x$ and year t given the set retirement age w

$$(5) {}_ik_{w+x}(t) = {}_i\ddot{a}_w(t_0) \cdot ({}_iN_{w+x}(t) - {}_iD_w(t)).$$

Thus in DB pension schemes, where the pension may be taken early or postponed, adjusting pensions to increased longevity using formula (5) automatically take into account also early pension reductions and deferred pension increases.

4.2 Recalculating the longevity factor using observed or projected mortality rates?

A longevity factor actually should take into account the past, present and future mortality rates. As a consequence of the unexpectedly rapidly falling mortality rates described in chapters 1 and 2 it is, however, very difficult to make reliable projections concerning life expectancy. According to Alho [2003] the life expectancy in Finland by the year 2050 is increasing within an 80% prediction interval by 2.3–9.1 years for women and 2.6–12.3 years for men. Projections thus include a large amount of uncertainty. It seems therefore to be unfair if possible errors in mortality projections would affect the pension level. An alternative is to recalculate the longevity factor only with observed mortality rates. In practice it is easy and transparent to recalculate a longevity factor based on observed mortality rates, because the statistical office in each country already produces life and mortality tables. E.g. the recently introduced Swedish NDC scheme uses this alternative. However, observed mortality rates always describe the past and a longevity factor using observed mortality rates follows the actual mortality trend with some lag. The lag could be minimized by recalculating the pensions each year according to new observed changes in mortality rates. An easier and more obvious way is to make the changes only once when the pension is granted. Even if such a coefficient reflects the changes in mortality with some portion of lag, it does not play a very significant role in a PAYG scheme. Mortality has decreased for decades but the adjustment coefficient is used from a certain year onwards. As a consequence of updating the longevity factor by observed mortality rates and applying it only once per per-

son, increased longevity influences not only increased working years (or a reduced pension) but to some extent also increased years in retirement.

4.3 Applications of the longevity coefficient to Finnish data

An aggregate of longevity factors (\ddot{a}_w) and longevity coefficients (${}_ik(t_0, t)$) at the retirement age 65 is put together in table 4, using mortality data produced by Statistics Finland. If the longevity coefficient had been taken into use in 1986, the coefficient would, depending on the discount rate used, have decreased in 15 years by 9–11 per cent or on average two thirds of a per cent per year. If the longevity is continuing to increase at the same speed as for these 15 years and the starting year t_0 is 2000, it means that the longevity coefficient in 2050 would be only 0.65. Using mortality projections produced by Statistics Finland gives a longevity coefficient of around 0.8. If just considering the result that the longevity coefficient may decrease by one third in 50 years, the following question arises: is it possible to live on only two thirds of the current pension? On the contrary, if the increase in longevity increases with a speed like that of the period from 1986 to 2001, it means that longevity increases by 7 years until 2050. At least in Finland it is not possible to finance on average 7 years more of time in retirement. Therefore, it seems necessary that part of the increase in longevity either increases the number of working years or affects the pension level.

Table 4. Life annuity-due and longevity coefficients for selected years and discount rates.

	Discount rate i			
	0%	1%	2%	3%
$\ddot{a}_{65}(1986)$	16.31	14.85	13.60	12.52
$\ddot{a}_{65}(2000)$	18.19	16.44	14.96	13.69
$\ddot{a}_{65}(2001)$	18.45	16.66	15.14	13.84
$\ddot{a}_{65}(2050)$	23.13	20.55	18.39	16.57
${}_ik_{65}(1986, 2000)$	0.897	0.903	0.909	0.915
${}_ik_{65}(1986, 2001)$	0.884	0.892	0.899	0.905
${}_ik_{65}(2000, 2050)$	0.786	0.800	0.813	0.826

Source of mortality rate: Statistics Finland

Chart 3 also shows the effect of the longevity coefficient on early retirement and deferred retirement between ages 60 and 70. When using mortality projec-

tions, the change of the longevity coefficient is very regular. The regularly decreasing mortality rates decrease the deferred coefficients a bit more than the early retirement coefficients. But, using many different longevity coefficients each year and possibly deciding whether the coefficients are final or preliminary does not make the pension scheme more transparent.

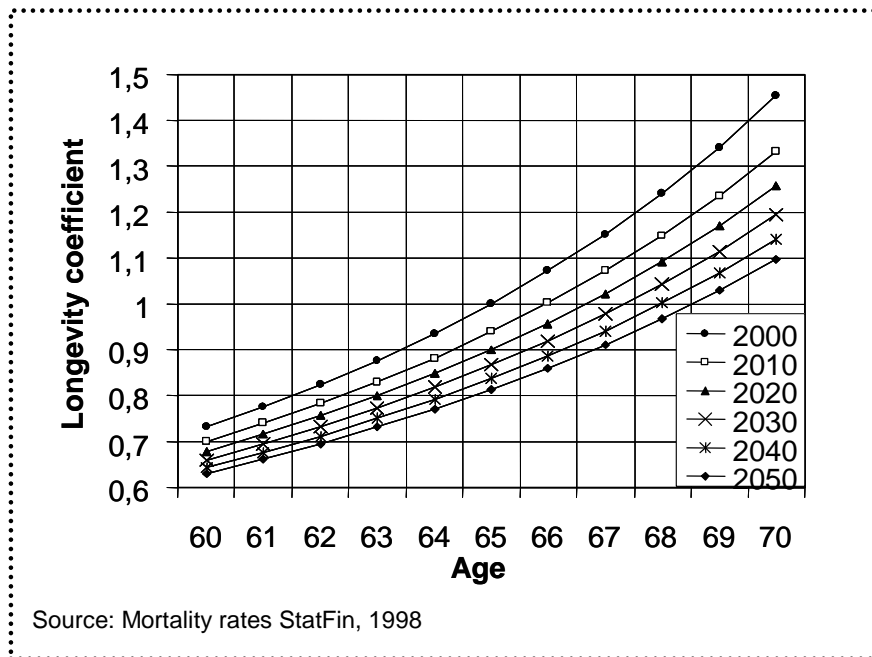


Chart 3. Longevity coefficients calculated with a discount rate of 2% and starting year $t_0 = 2000$.

Therefore a possible simplification is shown in chart 4 for the year 2050. Only the longevity coefficient for age 65 is recalculated in the simplification, while the early and deferred retirement coefficients are kept unchanged at the level of the year 2000. The simplified coefficients of early and deferred retirement change in the same proportion as the coefficients at the starting year 2000 change compared to the set retirement.

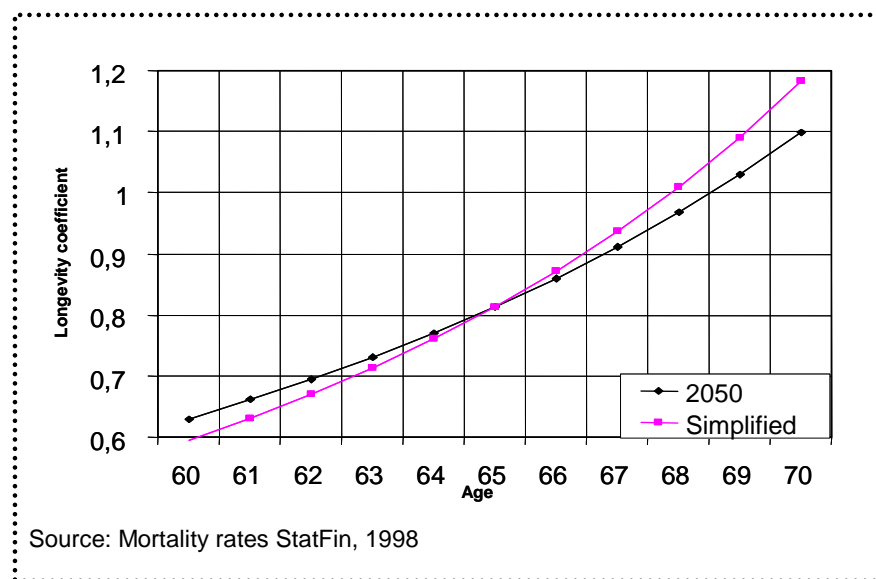


Chart 4. The longevity coefficients for the year 2005 and a simplified one.

4.4 Applying the longevity coefficient to disability, unemployment and other early pensions

As a starting point the longevity coefficient is applied to the whole population when reaching the retirement or early retirement age. The disability pension could also be adjusted already when granted, but would such a pension benefit be enough especially for breadwinners with children? The disability or other early pensions need not necessarily be adjusted by the coefficient, but at the latest when the pensioners reach the retirement age the pensions should be adjusted. The situation for these early pensioners are, on one hand, to some extent contradictory, because their possibilities of increasing their old-age pension by continuing to work a little bit longer are very limited. On the other hand, it is difficult to leave the early pensioners outside the adjustment system at least when they reach the retirement age. The incentive for the active population to work longer decreases if there is a possibility of avoiding pension adjustment by receiving some type of early benefit before the old-age pension. The nearer the old-age pension, the more difficult it also is to distinguish between who is disabled and who is not. Technically, if some group is left outside the adjustment, that group should also be excluded from the calculations concerning the longevity coefficient.

5 ADJUSTING THE PENSION SCHEME TO INCREASING LONGEVITY BY GRADUALLY RAISING THE RETIREMENT AGE

The traditional way of adjusting the pension scheme to increasing longevity is to raise the set retirement age. The raise can be achieved by agreeing on a plan of successive raises of the retirement age, or it can be tied to a suitable indicator, like keeping the proportion between working years and years in retirement unchanged, or by raising the retirement age once and later decide if there are need for additional raises.

The most common alternative is probably the last one, but in the following we shall look in more detail at the first alternative. The last alternative is actually a special case of the first one. The middle alternative, tying the raise to an indicator, is rather close to the use of adjustment coefficients and it is not discussed further.

When raising the retirement age successively according to a predetermined plan, it may be carried out by raising the retirement age by a whole year. The problem connected with this type of raise is that the difference in retirement age may be a whole year for people born in December and next January, even if the difference in age is as small as one day. To avoid too big differences in retirement ages for two successive cohorts the retirement age could be tied to a monthly level for each cohort. As the life expectancy at age 65 has increased by 4 years since the 1960s, a suitable raise could be to raise the retirement age by one year per decade. A more moderate criterion would be to raise the retirement age by one month per cohort. If the raise would be carried out beginning from the year 2005 the effect on the retirement ages is shown in table 5.

Table 5. Raising the retirement age on a monthly basis.

Cohort	Retirement age	Reached in year	Accrual rate, if target level unchanged
1940	65 years 1 month	2005–2006	1.497
1945	65 years 6 months	2010–2011	1.481
1951	66 years	2017	1.463
1957	66 years 6 months	2023–2024	1.446
1963	67 years	2030	1.429
1969	67 years 6 months	2036–1937	1.412
1974	68 years	2043	1.400

The greatest problem with raising the set retirement age is connected to the uncertainty related to the changes in mortality rates discussed in chapter 1. The target is that the retirement age is set already before a person enters the labour market and it stays unchanged until retirement age. When looking at the past 40 years the changes in mortality rates have been much greater than expected. If mortality rates in the future decrease more than expected, the retirement age needs to be adjusted further and if mortality rates decrease less than expected, the raises already carried out may be oversized.

Raising the retirement age is closely related to the accrual rates in a defined benefit scheme. When designing a pension scheme, usually a target level of the pension is fixed. If the accrual rate remains unchanged, it means that the target level of the pension increases. Paid pension contributions may, however, justify the increase. Probably the greatest problem concerning unchanged accrual coefficients is connected with early retirement. Disability and other pensions would increase with unchanged accrual rates, and that is hardly the intention.

Another alternative would be to decrease the accrual rates in proportion to the raise of the retirement age. Table 5 shows an example, where the accrual rates are tied to the cohorts, with the intention to maintain the target level unchanged. In this example also the accrued pension for the time elapsed is changed. With a target level of 60% for working 40 years, the target level can be kept unchanged if the accrual rate in the long run decreases from 1.5% to around 1.4%. The main problem connected to this alternative is to justify the past accrual cut.

A third alternative would be to maintain the past accrual unchanged but change the future accrual with the intention to maintain the target level unchanged. This can be achieved by using a constant coefficient for the next 40 years equal to 1.385.

6 THE FINNISH PENSION REFORM 2005 AND ADJUSTING THE SCHEME TO CHANGING LONGEVITY

The main goals of the reform are to postpone the average effective retirement age by 2–3 years, to adjust the pension scheme to increased life expectancy, to minimize the need to raise the contributions, to unify and simplify the pension system as a whole and to support the ageing population's well-being at work. Funding for the old-age pensions will be increased from 2003 onwards. The aim is to try to keep the old-age pension contribution rate as stable as possible. The laws concerning the pension schemes of the private sector were ratified in July 2003 while the plan is to give the government bill concerning the pension schemes for civil servants and municipal employees in April 2004.

The retirement age will become flexible between the ages 62 and 68. The accrued old-age pension will be granted without reduction between the ages 63 and 68. Only pensions granted at the age of 62 will be reduced and in case retirement is postponed past the age of 68, an increment of 0.4% per month will be granted. At the same time pathways to early retirement will be blocked by abolishing the unemployment pension granted to elderly unemployed and the individual early retirement pension granted to elderly employees on less severe criteria of disability. The part-time pension will be granted from 58 years onwards.

The main goal of making the retirement age flexible is to encourage people to continue working a couple of years more. But working an extra year today implies foregoing one year of pension and paying additional contributions, with often little or no increase in future pensions. Therefore the accrual rate will be raised to 4.5% per year, if the person continues working beyond the age of 63, while the normal accrual rate will be 1.5% per year. The high accrual rate also justifies the lack of deferred coefficients between the ages 63 and 68. Additional working years will also be made financially worthwhile by abolishing the 60% ceiling of the accrued pension.

The calculation of pensionable earnings will change. Starting from 2005 the calculation will be based on lifetime earnings in the age bracket 18–67 years. Also the revaluation of pensionable earnings and pensions in payment will change. Pensionable earnings will be revalued by a coefficient, where the weighting of the wage index is 80% and the consumer price index 20%, while

all pensions in payment will be adjusted with an index where the weighting is the other way around (20% wages and 80% prices).

The pension scheme will further be adjusted to increased life expectancy by introducing a longevity coefficient. The aim of the coefficient is to reflect part of the increase in life expectancy in the number of working years. This means that, starting from 2010, the amount of new old-age pensions will depend on the development of life expectancy compared to the year 2009. Only one longevity coefficient is determined for each year. It is always calculated for the cohort which turns 62, and it will be fixed for this cohort irrespective of the retirement age. Also disability pensions will be adjusted by the longevity coefficient at age 63. The coefficient will be shared by men and women. To avoid random fluctuation, the coefficient will be based on statistics from 5 adjacent years. The first longevity factor is based on observations for the years 2003–2007, the second from years 2004–2008 and so on. The longevity factors calculated from year 2010 onwards will all be compared to the longevity factor calculated for the cohort which turns 62 in 2009. The formula used for calculations differs slightly from formula (3) in chapter 4.1. In the numerator the number of survivors at the beginning of the year is replaced by the number of survivors in the middle of the year. This formula is a simplification of the monthly-based formula which is used in Sweden. Chart 5 shows that the difference between the two coefficients is infinitely small.

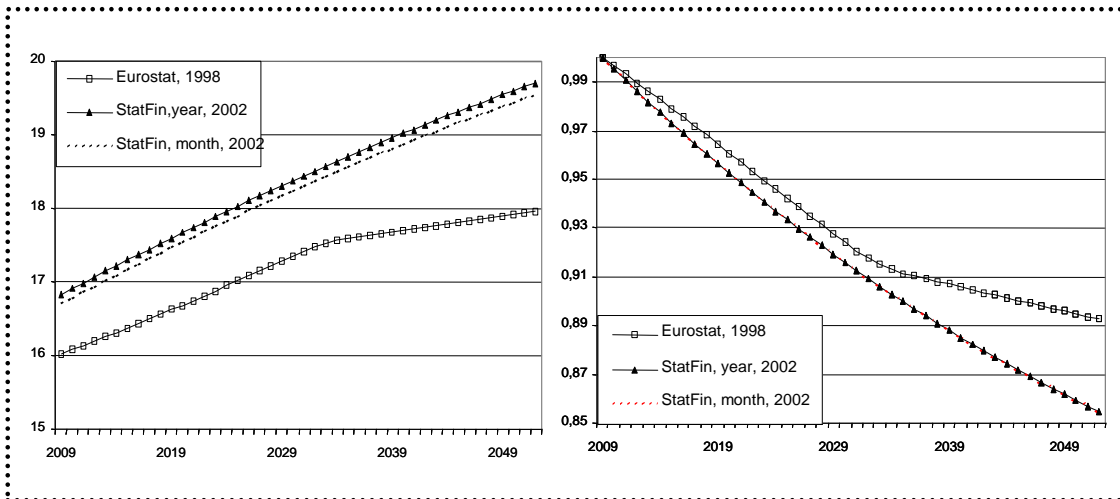


Chart 5. Longevity factors and corresponding longevity coefficients using projected values of mortality by Eurostat and StatFin.

The formula to be used in Finland is thus

$$a_x = \sum_{x=0}^{\infty} (L_{62-x} - l_{62}) \cdot 1.02^{-x}, \text{ where } L_x = (l_x + l_{x+1})/2.$$

The discount rate will be 2%. The discount rate reflects in the long run the difference between the average yield of the capital and the average index used for adjusting the accrued pensions.

Chart 5 also shows that using projected mortality rates from Eurostat and StatFin the longevity coefficient will in the long run decrease by 11–15%. The longevity coefficient is, however, decreasing very slowly and the pension will decrease only once per person. For a person with average income, the pension for each new cohort is decreasing by 4–6 euros per month. The additional working time needed to compensate for the decrease caused by the longevity coefficient is about 2–3 weeks for every new cohort. Table 6 shows that the additional working time needed to compensate for the longevity coefficient in the long term, around 2050, is not more than one and a half years. However, according to the Eurostat population projection, the life expectancy at age 62 increases by 3–4 years during the same period. The short additional working time compared to the increase in life expectancy is explained by the triple accrual coefficient for people working in the age bracket 63 to 68.

Table 6. The longevity coefficient for selected cohorts and the additional working time needed to compensate for the coefficient.

Year of birth	Year of retirement	Longevity coeff.	Additional working time compensating for the coefficient	
			Accrued pension 50% of wages	Accrued pension 60% of wages
1957	2020	0.956	5 months	6 months
1967	2030	0.917	11 months	1 year 1 m
1977	2040	0.892	1 year 2 m	1 year 5 m
1987	2050	0.880	1 year 4 m	1 year 7 m

Long-term pension projections made by the Finnish Centre for Pensions use a population projection based on the one made by Eurostat. Chart 6 shows that in the year 2050 the pension expenditure without a reform increases to about 36% of the wage sum, while the reform decreases the expenditure by 4.3 percentage points. The effect of the longevity coefficient is about 2.5 percentage points.

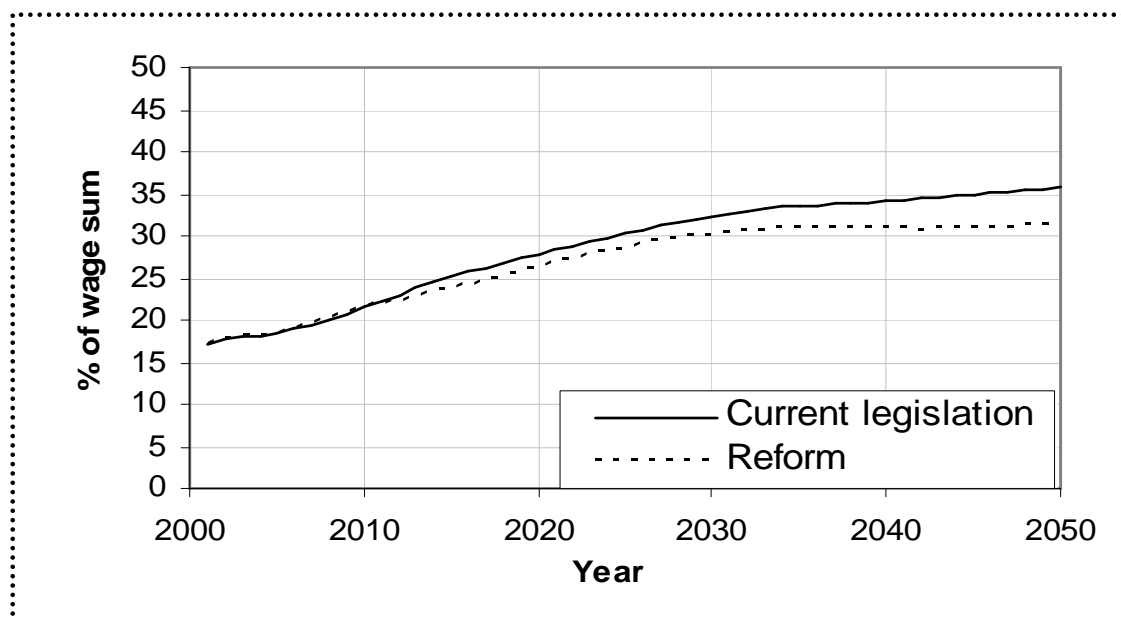


Chart 6. Pension expenditure in per cent of the wage sum for private-sector employees.

At this stage it is very difficult to assess how the insured will react to the flexible retirement age. Will everyone retire at 63 or will the triple accrual rate induce people to continue working? The sensitivity of the pension expenditure as a percentage of the wage sum was tested in relation to the choice of retirement age. For the test, the assumption was that everybody will retire at 63, at 68, or between ages the 63 and 68 (the most likely outcome).

The result (see chart 7) was that the choice of retirement age was not very significant with regard to the pension expenditure as a percentage of the wages. If everyone retires at 63, the pension expenditure rises in the beginning but decreases later, compared to the alternative of everyone retiring at 68. In general it is possible to say that in the long run the flexible retirement age is cost neutral as regards the pension expenditure in relation to the wage sum. For the next 15 years the cost is, however, the higher the earlier people retire.

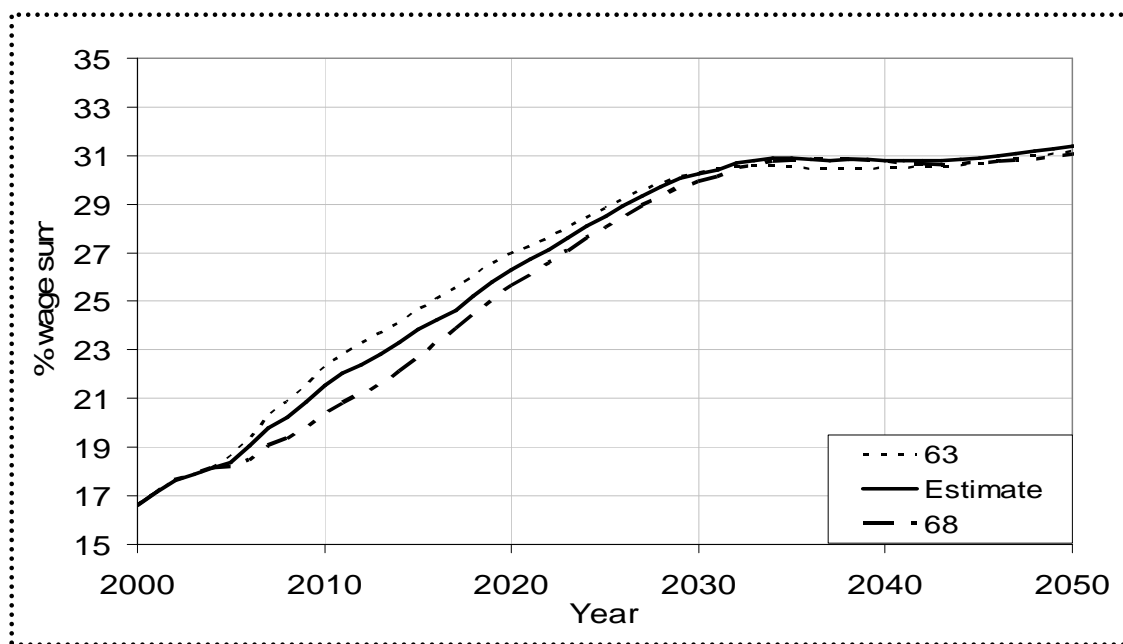


Chart 7. The sensitivity of the pension expenditure in per cent of the wage sum in regard to the choice of retirement age.

7 CONCLUSIONS

When making long-term projections concerning the cost of a pension scheme, the uncertainty concerning the economic assumptions is well-known but the demographic and especially the mortality fluctuation has often been considered to be under control. However, worldwide experience shows that usually calculations concerning the population projections have failed. Life expectancy has in most countries been growing faster than projected. As the costs of the pension schemes in most countries are increasing also due to many other reasons than longevity, the question of adjusting the retirement age to the changes in life expectancy will arise sooner or later.

The traditional way to handle this problem is to raise the set retirement age. The target is, however, that the retirement age is set already before a person enters the labour market and it stays unchanged until retirement age. The greatest problem with raising the set retirement age is therefore connected to the uncertainty related to the changes in life expectancy. If longevity in the future increases more than expected, the retirement age needs to be adjusted further and if longevity increase less than expected, the raises already carried out may be oversized.

One method recently spread is to adjust pensions to increased longevity instead of raising the set retirement age. Often the adjustment is combined with flexible retirement ages and forces the insured to make a choice: retire at the same age as earlier cohorts with a slightly reduced pension or compensate the reduced pension by continuing to work a little bit longer. This method takes into account the uncertainty related to future changes in longevity in the same way as the index adjustment-method of pensions takes into account the uncertainty related to future economic changes. The rules of calculation are fixed in advance but the value of the adjustment depends on observed changes. Differing from the index adjustment of pensions the longevity adjustment is usually made only once per person, when retiring, and using cohort-specified longevity factors.

REFERENCES

Alho, Juha (2003) Predictive Distribution of Adjustment for Life Expectancy Change. Finnish Centre for Pensions. Working Papers 3. Finland.

Eläkelainsäädännön muuttaminen (2002) ("Changes in the Pension Legislation"), Government Proposal to Parliament 242/2002. Finland.

Iyer, Subramaniam (1999) Actuarial mathematics of social security pensions, Quantitative Methods in Social Protection Series. ILO Geneva.

Introduction to the Hungarian Pension System. Central administration of national pension insurance (ONYF)- Hungary.

Kannisto, V. – Nieminen, M. (1996) Revised Life Tables for Finland 1881–1990, Population 1996:2, Statistics Finland.

Laitinen-Kuikka, S. – Bach, J. – Vidlund, M. (2002) Eläketurva Länsi-Euroopassa ("Pension Protection in Western Europe"). Finnish Centre for Pensions.

Lag om inkomstgrundad Ålderspension (1997/98) ("Law on Earnings-Related Old-Age Pension") Government Proposal to Parliament 1997/98:151. Sweden.

Life expectancy, statistics and projections (2002) United Nations.
<<http://www.un.org>>

Lindell, Christina (1999) Elinaika pitenee – miten käy eläkeiän? ("Longevity is increasing – what about the retirement age?"). Finnish Centre for Pensions. Report 18. Finland.

Modernisert folketrygd - bærekraftig pensjon for framtida. Norges offentlige utredninger, NOU. 2004:1. GAN Grafisk AS, Oslo (www.pensjonsreform.no).

Mortality rates, statistics and projections (1998) The Social Insurance Institute. Finland.

Mortality rates, statistics and projections (2002) Statistics Finland.

Mortality rates, projections (1998) Eurostat.

Nachhaltigkeit in der Finanzierung der sozialen Sicherungssysteme, Bericht der Kommission, Germany, August 2003.

<www.Sozialesicherungssysteme.de/index.html>

Sosiaalimenojen kehitys pitkällä aikavälillä SOMERA-toimikunnan taustaraportti (2002) ("The Development of Social Expenditure in the Long Term. Background Report of the SOMERA Commission"), Ministry of Social Affairs and Health, Publications 2002:21, Finland.

USA: Social Security Administration, SSA. <<http://www.ssa.gov>>

Working group, Arviota työmarkkinajärjestöjen sopiman yksityisalojen eläkeuudistuksen vaikutuksista (2002) ("Assessment of the pension reform of the private sector, agreed by the labour market organisations"), Finnish Centre for Pensions, Papers 40.

ZUS, Social Insurance institution. Social insurance in Poland. Information, facts. Warsaw 2002. <<http://www.zus.pl>>